

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006

REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have incorporated the subject matter of claim 3 into claim 1; and, correspondingly, have cancelled claim 3 without prejudice or disclaimer. In light of canceling of claim 3 without prejudice or disclaimer, Applicants have amended dependency of claim 6; in addition, Applicants have corrected a typographical error (redundancy) in each of claims 5-7.

Moreover, Applicants are adding new claims 8-11 to the application. Claim 8, dependent on claim 1, further defines the catalyst, noting the preferred catalyst as set forth in the first paragraph on page 5 of Applicants' specification. Claim 9 and 10, dependent respectively on claims 1 and 9, respectively recites that the benzamide compound and the benzoic acid compound are contained with a starting phthalonitrile compound used in the hydrogenation, with the concentration of benzamide compound and benzoic acid compound being controlled by controlling contents of these compounds contained with the starting phthalonitrile compound, and recites that concentration of these compounds is controlled by a purification treatment of the starting phthalonitrile compound; and claim 11, dependent on claim 10, recites that this purification treatment is a distillation process. Note, for example, the last full paragraph on page 6 of Applicants' specification.

Applicants note the indication by the Examiner in the first paragraph on page 2 of the Office Action mailed February 21, 2006, in connection with the Information Disclosure Statement filed November 12, 2004. It is emphasized that 37 CFR 1.97 and 1.98 refer to information, not "primary reference documents". In this regard, it is respectfully submitted that the submitted search report constitutes

Docket No. 396.42856X00

Serial No. 10/608,071

May 22, 2006

information; and, as the filing of the Search Report (which, inter alia, cited relevant passages of documents referred to therein) satisfied all applicable requirements of 37 CFR 1.97 and 1.98 upon filing thereof, such Search Report must be considered by the Examiner. Indication of consideration of Search Report is respectfully requested. Applicants will submit a further Form PTO/SB/08A, listing the European Search Report, for the convenience of the Examiner to indicate consideration thereof, upon request of the Examiner.

Applicants respectfully traverse the rejection of previously considered claims under 35 USC 103(a), "as being unpatentable over [Applicants'] own admission in view of case law", especially insofar as this rejection is applicable to the claims as presently amended. It is noted that the Examiner has not cited any reference, only relying upon what the Examiner considers as Applicants' explicit admission in the specification on page 1, lines 14-16, that:

"It is well known in the art to produce the xylylenediamine by hydrogenating the phthalonitrile compound in a liquid phase in the presence of a catalyst."

As will be shown in the following, even assuming, arguendo, that the above quoted sentence evidences prior art in connection with the presently claimed subject matter, such "prior art" would have neither disclosed nor would have suggested the presently claimed invention.

In particular, it is respectfully submitted that the "prior art" relied on by the Examiner would have neither disclosed nor would have suggested such process as in the present claims, wherein the hydrogenation is performed while controlling a concentration of a benzamide compound in a reaction solution to 0.35% by weight or lower and further controlling a concentration of a benzoic acid compound in the reaction solution to 0.1% by weight or lower (see claim 1); in particular, wherein the

Docket No. 396.42856X00
Serial No. 10/808,071
May 22, 2006

concentration of the benzamide compound in the reaction solution, which is being controlled, is 0.07% by weight or lower (see claim 2), or a concentration of a benzoic acid compound in the reaction solution is controlled to 0.05% by weight or lower (see claim 4).

In addition, it is respectfully submitted that the teachings of this "prior art" as applied by the Examiner would have neither disclosed nor would have suggested such process as in the present claims, having features of claim 1 as discussed previously, and, additionally, wherein the benzamide compound is at least one compound selected from the group thereof as in claim 5, and wherein the benzoic acid compound is at least one compound selected from the group thereof as in claims 6 and 7; and/or wherein the catalyst is selected from catalysts containing nickel, cobalt or palladium, as in claim 8; and/or wherein the benzamide and benzoic acid compounds are contained with a starting phthalonitrile compound used in the hydrogenation, with concentration of the benzamide and benzoic acid compounds being controlled by controlling contents of these benzamide and benzoic acid compounds (see claim 9), in particular wherein such control is performed by a purification treatment of the starting phthalonitrile compound (see claim 10), and wherein such purification treatment is a distillation process (see claim 11).

The present invention relates to a process for producing a xylylenediamine and/or a cyanobenzylamine by hydrogenation of a phthalonitrile (dicyanobenzene) compound. These produced compounds are useful as raw materials and intermediate materials, as described on page 1, lines 6-12, of Applicants' specification.

While, as described on page 1, lines 14-16, of Applicants' specification, it is known to produce xylylenediamine by hydrogenating the phthalonitrile compound in

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006

a liquid phase in the presence of a catalyst, Applicants have found that various problems arise in connection therewith. That is, in the course of study on production of xylylenediamine and/or cyanobenzylamine by hydrogenation of phthalonitrile compounds, the present inventors have found that conventional methods unfavorably cause significant changes in the yield and catalyst life depending upon raw material used and reaction conditions. More particularly, the present inventors have found that a benzamide compound contained in a reaction solution for hydrogenation of the phthalonitrile compound has a considerable influence on yield of desired product produced, and on the catalyst life; and, particularly, have found that a benzamide compound and a benzoic acid compound are catalyst poisons for the liquid-phase hydrogenation of a phthalonitrile compound. Applicants have found that by controlling the concentration of benzamide and benzoic acid compounds to a specific level or lower, a reduction in yield of the desired product can be avoided, and catalyst life is enhanced. Accordingly, through the present invention, wherein a concentration of benzamide compound and of benzoic acid compound is controlled respectively, in the reaction solution, to 0.35% by weight or lower and to 0.1% by weight or lower, yield of the xylylenediamine and/or cyanobenzylamine is stable and occurs economically, at high yields with prolonged catalyst life. Note, in particular, page 3, lines 12-28, of Applicants' specification.

Note also the paragraph bridging pages 5 and 6 of Applicants' specification. Note particularly the description therein that when the concentration of the benzamide compound is reduced to 0.07% by weight or lower, the catalyst is effectively prevented from being deactivated, resulting in a prolonged catalyst life; and that in industrial production of the desired materials, catalyst life is an extremely

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006

important factor, whereby advantageous results are achieved when the concentration of the benzamide compound is controlled to 0.07% by weight or lower.

As for advantages achieved according to the present invention, note the Examples and Comparative Examples on pages 8-15 of Applicants' specification. Note that according to the present invention, yield of xylylenediamine was improved (compare Examples 1-4 with Comparative Examples 1-4); and that yield of xylylenediamine was increased, with catalyst life increased (compare Examples 5-8 with Comparative Example 5). Note also Example 9 and Comparative Example 6, showing increased yield of cyanobenzylamine as primary product.

It is respectfully submitted that this evidence in Applicants' specification must be considered, in determining patentability of the presently claimed subject matter. See In re DeBlauwe, 222 USPQ 191 (CAFC 1984). Properly considered, this evidence shows unexpectedly better results achieved according to the present invention, clearly supporting patentability thereof.

As set forth in the foregoing, the Examiner relies, as "prior art", on the statement in Applicants' specification at page 1, lines 14-16, of production of xylylenediamine by hydrogenating the phthalonitrile in a liquid phase in the presence of a catalyst. However, it is respectfully submitted that this "prior art", as relied upon by the Examiner, would have neither taught nor would have suggested such control of concentration of benzamide compound of a benzoic acid compound, as in the present claims, much less such control to a concentration of benzamide compound in a reaction solution to 0.35% by weight or lower, and such control of concentration of the benzoic acid compound in the reaction solution, especially such control to 0.1% by weight or lower, as in claim 1, and advantages thereof; and/or other features of the present invention as discussed previously, and advantages thereof.

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006

The Examiner's contention on page 3 of the Office Action mailed February 21, 2006, that the use of a more purified starting material in the interest of improving the reaction (any reaction) would have been obvious to one of ordinary skill in the art at the time of the present invention, is respectfully traversed. It is respectfully submitted that Applicants have discovered that benzamide compounds and benzoic acid compounds are catalyst poisons for the liquid-phase hydrogenation of a phthalonitrile compound. The Examiner has pointed to no evidence rebutting that Applicants have made this discovery; that is, the Examiner has pointed to no evidence showing that such materials acting as catalyst poisons were known in the prior art. Absent such discovery, the Examiner has pointed no motivation for removing the benzamide compound and benzoic acid compound, and advantages achieved thereby. The Examiner has pointed to no evidence or reasoning that one of ordinary skill in the art would have removed any/all impurities from the reaction solution; it is respectfully submitted that the fact that a material is an impurity does not provide a basis/motivation for removal thereof.

It is emphasized that Applicants have found a source of the problem of reduced yield and reduced catalyst life in liquid-phase hydrogenation of a phthalonitrile compound in the presence of a catalyst; and, having discovered this source of the problem, have provided a solution thereto (that is, of controlling the concentration of benzamide compound and benzoic acid compound, especially to limits as recited in the present claims). Taking the present invention as a whole, including discovery of the source of the problem and solution thereto, it is respectfully submitted that the present invention patentably distinguishes over the "prior art" applied by the Examiner. See In re Sponnoble, 405 F.2d 578, 160 USPQ

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006

237 (CCPA 1969). In this regard, it is again emphasized that Applicants discovered the source of the problem, which forms part of the present invention.

Contentions by the Examiner in the paragraph bridging pages 3 and 4 of the Office Action mailed February 21, 2006, are noted. Initially, the undersigned notes reference by the Examiner to In re Vaeck, 947 F.2d 488, 492, 20 USPQ 2d 1438, 1441 (Fed. Cir. 1991). It is to be noted that this case refers to claimed subject matter which "has been rejected as obvious in view of a combination of prior art references". As can be appreciated, the Examiner has not even relied on one single prior art reference.

More importantly, one of the factors in Vaeck is whether the prior art would also have revealed that in so carrying out the claimed process, "those of ordinary skill would have a reasonable expectation of success". It is respectfully submitted that the Examiner has not established such "reasonable expectation of success. In this regard, the statement by the Examiner that a reaction which employs purified starting material "is likely to be superior" does not establish the reasonable likelihood of success, especially without discovery of the source of the problem as achieved by Applicants. That is, "likely to be superior" does not equate to a "reasonable expectation of success", as referred to in In re Vaeck, supra. This is particularly true under the present circumstances, where Applicants have discovered a source of the yield and catalyst life problems. It is respectfully submitted that absent discovery the problem as found by Applicants, there would have been no "reasonable expectation of success". In this regard, the following caveat set forth in In re Vaeck, supra at 20 USPQ 2d 1442, is noted:

"Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure."

Docket No. 396.42856X00
Serial No. 10/608,071
May 22, 2006


To conclude, it is respectfully submitted that Applicants have discovered that a benzamide compound and a benzoic acid compound are catalyst poisons for the liquid-phase hydrogenation of a phthalonitrile compound; and based upon this discovery, provide a process having unexpectedly better advantages, by controlling a concentration of a benzamide compound of a benzoic acid compound in the reaction solution; and, moreover, have found a specific level of concentration at which the benzamide compound and benzoic acid compound should be controlled, for providing unexpectedly better yield of the produced product and unexpectedly longer lifetime of the catalyst. Taking the present invention as a whole, as required under 35 USC 103, it is respectfully submitted that Applicants have established unobviousness of the presently claimed subject matter, notwithstanding the statement in Applicants' specification at page 1, lines 14-16.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application are respectfully requested.

Applicants request any shortage in fees due in connection with the filing of this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (case 396.42856X00), and credit any excess payment of fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By 
William I. Solomon
Registration No. 28,565

WIS/ksh
1300 N. Seventeenth Street
Suite 1800
Arlington, Virginia 22209
Tel: 703-312-6600
Fax: 703-312-6666